made to furnish theoretical explanations of the various analytical reactions. A few practical details may be quoted as illustrating modern tendencies in laboratory practice. The difficulty of separating nickel and cobalt is overcome by using dimethylglyoxime to precipitate the former metal, whilst the latter is identified in an ethereal extract with ammonium thiocyanate. There is a reversion to an old process in the removal of phosphoric acid from the precipitable metals by means of tin and nitric acid. Absolute alcohol is used to remove calcium nitrate from the mixed nitrates of the alkaline earths. G. T. M.

THE FLOW OF SUBTERRANEAN WATERS.

Le Principe du Mouvement des Eaux Souterraines. By J. Versluys. Traduit du hollandais par F. Dassesse. Pp. 147. (Amsterdam: W. Versluys, 1912.) Price 7 francs.

CALCULATIONS concerning the flow of subterranean water have almost invariably hitherto been based upon the classical law of Darcy, published in 1856—a law which states that the quantity discharged is directly proportional to the head, and inversely proportional to the thickness of the stratum traversed. The terms are simple, and, for general purposes, are sufficiently close approximations to the truth.

It has been demonstrated more than once that the "law" is not absolutely exact, and, in several cases, the divergency from experimental results has been considerable. The law, in fact, has manifest limitations. Darcy omits all reference to temperature, and, indeed, it is doubtful whether he was acquainted with the experiments of Poiseuille, although these had been published ten years earlier, in 1846. The results obtained by Poiseuille led that investigator to conclude that the mean velocity of the fluid depended, in part, on its specific gravity and also on the temperature.

The object of the author of the brochure before us has been to review the situation in the light of recent research, as exemplified by the work of King, Richert, and others. He investigates, in the first instance, the purely theoretical problem of water-flow in its most general form. Then the various numerical results published in the literature of the subject are collated in a form suitable for comparison with the calculated results, and where pronounced divergences occur, observations and explanations are furnished. Finally, for strictly practical purposes, the author gives a series of numerical coefficients for use in cases where merely general approximations will serve.

The book consists of thirteen chapters and is a most painstaking and valuable compilation of the data at present available on the subject.

OUR BOOKSHELF.

Das Relativitätsprinzip. Zweite vermehrte Auflage. By Dr. M. Laue. Pp. xii+272. (Braunschweig: F. Vieweg und Sohn, 1913.) Price 8 marks.

THE second edition of Prof. M. Laue's book on relativity, though on the same plan as the first edition of 1911, contains several additions. In chapter ii. a short discussion of a second arrangement of the Röntgen-Eichenwald experiments is inserted. The kinematic part of the theory of relativity, chapter iii., shows some slight explanatory extensions in § 6, and an enlarged discussion of the inadmissibility of propagation of any physical effects with a velocity exceeding that of light (§ 7). The "cause and effect" point of view here adopted, which leads to a rejection of any hypervelocity of propagation, seems somewhat too narrow. At any rate, it prevented the author from considering the admirable researches on relativistically rigid bodies of M. Born, and especially of Herglotz. In § 8 we remark a fuller exposition and illustration of the notion of "proper time."

In chapter iv. the vector product of two six-vectors and the four-dimensional "Gauss theorem" are inserted. Chapter v. contains, besides a few minor additions, a considerably extended treatment of the theory of the Trouton and Noble experiment, and a much amplified exposition of four-dimensional potential-theory, following the lines of a paper by Sommerfeld. Chap. vi. contains but a few new lines (on pp. 148–164), while vii. (Dynamics) contains many changes and ample additions, viz., Minkowski's dynamics of a point-mass, remarks on the foundations of the dynamics of continuous bodies (§ 27), and the rotational momentum, with a pair of instructive examples, several minor additions in the following paragraphs, and finally the chief addition to the first edition, namely, relativistic hydrodynamics, giving the general equations of motion, and treating the interesting special case of fluids "of smallest compressibility," both essentially on the lines of a paper by Dr. E. Lamla (*Ann. d. Phys.*, vol. xxxvii., p. 772, 1912).

The Dictionary of Entomology. By N. K. Jardine. Pp. ix+259. (London: West, Newman and Co.) Price 6*s.* net.

THIS useful compilation is a glossary of the technical terms used in describing the structure of insects throughout their several stages. Within the limits which the author has imposed on himself it is likely to be of much service to students of entomology. These limits, it is true, are somewhat narrow; there is no mention of individual species of insects, or of genera or families. The orders, when given, are defined in the briefest possible manner, and frequently there is no indication of the insects comprised in them. The words "Coleoptera" and "Lepidoptera" find a place, but there is no mention of Dermaptera, Odonata, Homoptera, or Heteroptera. Hemiptera and Neuroptera are given, but beyond a bare defini-

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tion there is nothing to show their content. Some of the terms used in insect bionomics might have been included without greatly adding to the bulk of the work; these are not exclusively applicable to insects, but it is in entomological literature that they are chiefly to be met with. It might also have been well to add references in the case of the less usual terms.

The derivations will be welcomed by many; they are sometimes omitted, as under "coenogonous." Two incompatible derivations are given for "caterpillar," but the author does not help us to decide between them. A few misprints may be noted; "carneous" for "corneous," under "cranium"; "unbra" for "umbra"; "tergum," under "anal angle," probably for "termen," though the latter is insufficiently explained. Other slips occur, but on the whole the book is well suited for its purpose.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of Nature. *No notice is taken of anonymous communications.]*

Antarctic Barometric Pressure.

The reduction of the barometric readings taken during the first year of Capt. Scott's Antarctic expedition has shown what I imagine to be an unprecedented rise of barometer from one month to the next. The mean barometer during November was higher than during October by 0·81 in. at Cape Evans, 0·80 in. at Cape Adare, and 0·87 in. at the Norwegian winter quarters. The rise continued into the next month, and the mean value at all three stations for December was approximately one inch higher than that for October.

The instability of the atmosphere shown by such a change has a melancholy interest in view of the sad disaster caused by the weather, and is further of great meteorological importance. I should therefore be grateful for any information of similar large changes, so that they may be considered in my discussion of the meteorological results of the expedition.

The following table gives the mean height of the barometer at the three stations. The data have been reduced to sea-level and normal temperature and gravity. The large difference between the mean values at Framheim and Cape Evans is being investigated.

	Framheim	Cape Evans	Cape Adare
Lat.	78° 38′ S.	77° 35′ S.	73° 27′ S.
Long.	195° 30′ E.	166° 33′ E.	170° 15′ E.
1911			
February	—	29·31	—
March	—	29·21	29·12
April	29·08	29·32	29·25
May	29·02	29·23	29·05
June	28·88	29·11	29·11
July	28·86	29·08	29.01
August	28·94	29·19	29·06
September	28·90	29·16	28·98
October	28·61	28·82	28·76
November	29·49	29 63	29·56
December	29·66	29·75	29·72
1912			
January	29·36	29·43	—

George C. Simpson.

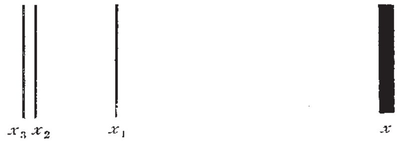
Simla, March 20.

X-Ray Spectra.

We have recently been carrying out some experiments with the object of finding whether spectra of heterogeneous beams of X-rays can be obtained by letting the rays fall on a crystal surface which would serve as a diffraction grating.

A beam of rays from a Röntgen bulb was directed on to the cleavage surface of a crystal of selenite at almost grazing incidence, the beam being made practically parallel by means of suitable lead stops. All the photographs taken of the reflected beam show exceedingly well-defined lines, which are not equally spaced, their number and distances apart varying according to the particular bulb used. These lines are parallel to each other and to the slit. The hardness of the bulb affects the relative intensity of the lines, but apparently makes no difference to their relative positions. Using the same bulb, crystals of different thicknesses all give the same lines.

The accompanying figure represents diagrammatically the lines obtained in one of the photographs. The direct beam strikes the plate at x, and in the reflected beam are seen three well-defined lines, x_1, x_2, and x_3 (in addition to what appear to be interference bands, not shown in the figure). When the bulb was soft the line x_1 was very intense, whilst the other two lines were comparatively faint. Another photograph taken with the same bulb after it had been hardened shows the line x_1 very much less intense than formerly, whilst the lines x_2 and x_3 have increased in intensity. It appears, therefore, that the line x_1 is due to the softer constituents of the beam, and the lines x_2 and x_3 are due to the harder constituents. That is to say, the rays of longer wave-length are less deviated than the rays of shorter wave-length.



The results suggest that the lines obtained may be spectral lines in the spectra of the beams emitted from the respective bulbs. Further experiments are being carried on.

E. A. Owen.
G. G. Blake.

Teddington, Middlesex, April 7.

X-Rays and Crystals.

On repeating the experiments of Laue, Friedrichs, and Knipping on the transmission of X-rays through crystals, I have found that the transmitted rays may easily be made visible by means of an ordinary fluorescent screen, if we use a sufficiently large pencil of rays, and the crystals are sufficiently transparent to the incident ray.

The X-ray tube used was a Müller-tube of 20 cm. diameter, with water-cooling; the current was supplied by a Toepler influence machine with sixty plates. The diameter of the pencil of rays was 0·5–1·0 cm. The crystals examined were borax, alum, mica, fluorspar, rock-salt, rock-crystal, cane-sugar, &c., the thickness varying from 4 mm. to 1 cm. The transmitted rays show numerous detached fluorescent spots of elongated shape. If we rotate the crystal about an axis perpendicular to the incident ray, the spots move generally across the central spot caused by the incident ray, but we may choose the axis of rotation such that some of these spots remain stationary while the crystal is rotated.

Groups of detached pencils are arranged, as it were,

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